MI-81-07

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

February 21, 1981

TO: Roy Schraneck
District 1

FROM: Scott C. Ross, Chief SCR
Industrial Compliance Unit

SUBJECT: Hoover Universal, Inc., Saline

Permit No.: MI 0003999

The survey conducted Oct. 8-9, 1980 at the above facility will be transmitted in the following manner:

√ through the Industrial Compliance Unit by Notice of Noncompliance (or Notice of Violation). Appropriate comments from district staff on the survey contents would be appreciated.

___ by transmittal letter from the district with any appropriate comments. If a response is requested, the response date should be specified in the letter.

SCR:tkr
cc: WQD File

Two out of three grab samples were within the daily maximum limitation for Total Suspended Solids at Outfall 001 and the composite sample exceeded the daily maximum limit. The daily average limitation can not be used for comparison. The company needs to check their lab procedures for Suspended Solids.

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION BUREAU
POINT SOURCE STUDIES SECTION

Report of an
Industrial Wastewater Survey
Conducted at
HOOVER UNIVERSAL, INC.
All Outfalls No. 810017
NPDES Permit No. MI0003239
Washtenaw County
Saline, Michigan
October 8-9, 1980

Survey Summary

Wastewater monitoring was performed during one twenty-four hour survey period starting Wednesday, October 8, 1980.

The results of this survey are compared to the final limitations in the facility's expired National Pollutant Discharge Elimination System (NPDES) Permit, No. MI0003239. Based on that comparison the daily maximum suspended solid concentration was exceeded during the survey. The suspended solid loading during the survey was greater than the daily average loading limitation (Table 3).

The survey results are compared to the self-monitoring results reported in the company's Monthly Operating Report. Survey concentrations and loading for suspended solids were greater than the monthly maximums reported by the company (Table 3).

The composite sample collected during the survey were split with the company for comparison of laboratory results. The results compare well, except for suspended solids concentration where the company's concentration is significantly less than the Environmental Protection Bureau Laboratory result (Table 4).

The last survey performed at this facility was in August, 1980. The comparison is presented as Table 5.

Survey Comment

This survey was performed in conjunction with an intensive river study on the Saline River by the Comprehensive Studies Section.

Plant Processes

Hoover Universal, Saline Die Casting Division manufactures finished plated parts for the automotive industry. The plant employs 100 people and operates

9 hours per day, 5 days a week. Production during the survey was below normal. The plant has 13 zinc die casting machines. The die cast parts are trimmed, buffed, plated, painted, then assembled into a final product for shipment. In addition to automotive parts, the plant will begin producing some plumbing fixtures soon.

The plating operation consists of a single automatic plating line and a small re-plate line. The plating line is composed of alkaline and electro-cleaners flowing rinses, a copper-cyanide plate, a nickel plate, a chrome plate, and an acid dip. The re-plate line has a caustic stripper, rinses, and electro-cleaner, an acid dip and a chrome plate.

Water Supply, Wastewater & Treatment

All the water used by the plant is obtained from three company-owned wells. Plating solution make-up water is deionized; boiler water is softened. Domestic wastes, cooling tower bleed-off, water softener backwash and boiler blowdown are discharged to the Saline Wastewater Treatment Plant.

Plating wastewater, deionizer backflush water and cooling water from two air compressors are treated in the plant's wastewater treatment system (Figure 1).

Chromium-bearing wastewater is collected in one of the two batch treatment tanks and treated by adding sulfuric acid and sodium hyposulfite. The nickel and acid rinses combine with this treated wastewater and are pumped to the reactor clarifier (for precipitation and settling) which discharges to the first of two settling ponds in series. Usually, one chrome batch per day is discharged via outfall 810193.

Cyanide-bearing wastewater is collected in a batch treatment tank and treated through the addition of sodium hypochlorite, sodium bisulfate, ferric sulfate, and a polymer. Roof runoff and parking lot and yard drainage collect in an underground cistern and are treated along with the cyanide batch. This treated wastewater is discharged to the first settling pond or to the reactor clarifier when no chromium wastes are present. Three cyanide batches (or more if it rains) are treated daily, outfall 810200.

Lime and caustic soda are added to the reactor clarifier, according to what is receiving treatment, to adjust the pH to about 9.

Cooling water and alkali rinse water are neutralized and pumped directly to pond two. The discharge from the second settling pond, outfall 810038, is to the Saline River through an open ditch (Figure 2).

Sludge from the clarifier is dewatered in a filter press and hauled to the landfill. More sludge is disposed of during the summer when the two flow-through settling ponds and the batch treatment tanks are cleaned. The sludge lagoon across the Saline River is no longer being used. The four groundwater monitoring wells located around the perimeter of the lagoon are sampled monthly, all year around.

Survey Procedure

The flow and samples were obtained as follows:

Outfall	Flow Measurement	Sampling
810038 (001)	Staff installed 12" rectangular weir; staff installed water level recorder.	Automatic scoop sampler and individual grabs.
810200 (Cyanide Batch)	None	Individual grabs.
810193 (Chromium Batch)	None	Individual grab.

A water level recorder provides a continuous account of the liquid level or head above the crest of a weir. A head versus time graph is obtained for the duration of the survey period. The total volume of wastewater over the weir during the survey period is computed from the graph.

An automatic sampler composites samples at timed intervals. Samples may be proportional to the instantaneous flow over the weir.

An individual grab is a single instantaneous sample.

Samples were analyzed by the Environmental Protection Bureau Laboratories located in Lansing.

Samples were preserved according to Table 6. The results of the physical, chemical and bacteriological analyses are presented in Tables 1 & 2.

Hoover Universal - Saline

Table 1 Analyses of composite samples.

Outfall	810038 (001)	
Survey Period From	10-8-80 - 1330	
To	10-9-80 - 1330	
Computed flow rate[1] (M^3/day)	592	
Highest flow rate (M^3/day)	910 - 10-8-80 @ 1525	
Lowest flow rate (M^3/day)	203 - 10-9-80 @ 0547	
	mg/l	kg/day
COD	42	25
TOC	16	9.5
Cyanide (Total)	< 0.005	--
Cyanide (Free)	< 0.005	--
BOD_5	28	17
$CBOD_5$	29	17
$CBOD_{20}$	46	27
Nitrite & nitrate nitrogen-N	0.18	0.11
Ammonia nitrogen-N	0.09	0.05
Kjeldahl nitrogen-N	2.6	1.5
Orthophosphates-P	0.24	0.14
Total phosphorus-P	0.26	0.15
Hexavalent chromium (Cr^{+6})	< 0.002	--
Chlorides	450	270
Sulfate (SO_4)	750	440
Suspended solids	46	27
Dissolved solids	2,400	1,400
Conductance (umhos/cm)	3,750	--
Total cadmium (Cd)	< 0.02	--
Total chromium (Cr)	0.14	0.083
Total copper (Cu)	0.09	0.05
Total nickel (Ni)	0.21	0.12
Total lead (Pb)	< 0.05	--
Total zinc (Zn)	0.38	0.22

1 - Flow rates used in the computation of kg/day
To obtain MGD multiply M^3/day by 0.0002642
To obtain lbs/day multiply kg/day by 2.205

Hoover Universal - Saline

Table 2 Analyses of grab samples.

Date	Time	Flow[1] M^3/day	Temp.[2] °C	pH[2] S.U.	Specific Conductance (umhos/cm)	D.O. mg/l	O&G I.R. mg/l	O&G Grav. mg/l	COD mg/l	TOC mg/l	Total cyanide mg/l	Free cyanide mg/l	BOD_5 mg/l
810038 (001)													
10-8-80	1340	600	18.5	10.3	3,400	< 0.1	2	< 2	53	17	0.006	< 0.006	31
10-8-80	2300	600	16.0	9.8	2,300	< 0.1	2	< 2	51	15	< 0.005	< 0.005	30
10-9-80	0800	370	12.0	10.2	2,600	< 0.1	2	3	51	16	0.021	< 0.021	28
810193 (Chrome Batch)													
10-9-80	0810	--	15.5	10.2	--	--	--	--	--	--	< 0.005	< 0.005	--
810200 (Cyanide Batch)													
10-8-80	1500	--	19.5	11.9	--	--	--	--	--	--	0.025	< 0.025	--
10-9-80	1220	--	17.0	11.7	--	--	--	--	--	--	< 0.005	< 0.005	--

		$CBOD_5$ mg/l	$CBOD_{20}$ mg/l	Nitrite & nitrate nitrogen mg/l	Ammonia nitrogen mg/l	Kjeldahl nitrogen mg/l	Ortho-phosphates-P mg/l	Total phosphorus-P mg/l	Hexavalent chromium mg/l	Sulfate mg/l	Chloride mg/l
810038 (001)											
10-8-80	1340	31	52	0.24	0.73	4.2	0.14	0.22	0.005	920	220
10-8-80	2300	26	46	0.22	0.50	4.4	0.26	0.32	0.005	550	190
10-9-80	0800	28	46	0.20	0.51	3.0	0.09	0.12	0.004	610	210
810193 (Chrome Batch)											
10-9-80	0810	--	--	--	--	--	--	--	< 2 PS	--	

		Susp. solids mg/l	Total diss. solids mg/l	Total cadmium mg/l	Total chromium mg/l	Total copper mg/l	Total nickel mg/l	Total lead mg/l	Total zinc mg/l
810038 (001)									
10-8-80	1340	29	2,300	< 0.02	0.23	0.05	0.34	< 0.05	0.26
10-8-80	2300	13	1,200	< 0.02	< 0.05	0.05	0.17	< 0.05	0.45
10-9-80	0800	60	1,200	< 0.02	0.13	0.05	0.16	< 0.05	0.31
810193 (Chrome Batch)									
10-9-80	0810	--	--	< 0.02	390	2.1	17	0.78	14
810200 (Cyanide Batch)									
10-8-80	1500	--	--	< 0.02	0.17	2.4	2.1	< 0.05	< 0.05
10-9-80	1220	--	--	< 0.02	0.09	0.58	0.07	< 0.05	< 0.05

1 - Flow at time of grab sampling.
2 - Values determined in the field at time of sampling.

PS - Possible interference may have affected the accuracy of laboratory result.

Hoover Universal - Saline

Table 3 Comparison of survey results with the facility's NPDES Permit and Monthly Operating Report.

Parameter (Unit)	NPDES Permit Final Limitations		October Monthly Operating Report				Survey Results[1]
	Daily Average	Daily Maximum	Monthly Average	Monthly Maximum	10-8-80	10-9-80	
810038 (001)							
Flow (M^3/day)	--	--	590.8	742.2	648.0	632.5	592
Susp. solids (mg/l)	20	30	19.08	29.00	20	24	46 (29, 13, 60)
(kg/day)	19.1	29.1	11.3	18.0	13.1	15.3	27
Oil & Grease (mg/l)	--	10	0	0	0	0	(<2, <2, 3)
Total chromium (mg/l)	0.3	0.6	0.216	0.32	0.17	0.9	0.14 (0.23, <0.05, 0
(kg/day)	0.29	0.57	0.13	0.21	0.11	0.059	0.083
Total copper (mg/l)	0.3	0.6	0.108	0.24	0.06	0.05	0.09 (0.05, 0.05, 0.05)
Total copper (kg/day)	0.29	0.57	0.064	0.15	0.04	0.03	0.05
Total nickel (mg/l)	0.5	1.0	0.256	0.42	0.07	0.38	0.21 (0.34, 0.17, 0.16)
(kg/day)	0.5	0.95	0.15	0.24	0.045	0.24	0.12
Total zinc (mg/l)	0.3	0.6	0.215	0.31	0.22	0.21	0.38 (0.26, 0.45, 0.31)
(kg/day)	0.29	0.57	0.13	0.19	0.15	0.14	0.22
Cyanide (mg/l)	--	0.025	0.014	0.025	0.005	0.025	< 0.005 (0.006, <0.005, 0.021)
Hexavalent chromium (mg/l)	0.05	0.1	0.022	0.04	0.03	0.03	< 0.002 (0.005, 0.005, 0.004)
Total residual Cl_2 (mg/l)	--	--	0	--	0	0	--
pH (S.U.)	not <6.5 nor >10.5		--	10.4 min. 8.8	10.2	10.2	(10.3, 9.8, 10.2)
810193 (Chrome Batch)							
Flow (M^3/day)	--	--	150	240	310	240	--
Hexavalent chromium (mg/l)	--	--	0	--	0	-	(<2 PS)
pH (S.U.)	--	--	--	2.7 min. 2.1	2.1	max. 2.6 min. 2.4	(10.2)
810200 (Cyanide Batch)							
Flow (M^3/day)	--	--	140	240	180	120	--
Total cyanide (mg/l)	--	--	0	--	0	0	(0.025, <0.005)
pH (S.U.)	--	--	--	11.8 min. 11.0	max. 11.8 min. 11.5	max.11.7 min.11.4	(11.9, 11.7)

1 - Survey results are for the composite sample. Grab sample ranges are shown in parentheses ( ).
PS - Possible interference.
To obtain MGD multiply M^3/day by 0.0002642 To obtain lbs/day multiply kg/day by 2.205

Table 4 Comparison of the laboratory analytical results obtained by Hoover Universal - Saline and the Environmental Protection Bureau from the split composite samples.

Outfall	810038 (001)	
	Hoover Universal mg/l	E.P.B. mg/l
Total cyanide	0	< 0.005
Hexavalent chromium (Cr^{+6})	0	< 0.002
Suspended solids	18	46
Total chromium (Cr)	0.12	0.14
Total copper (Cu)	0.07	0.09
Total nickel (Ni)	0.31	0.21
Total zinc (Zn)	0.25	0.38

Hoover Universal - Saline

Table 5 Comparison of the previous survey results with the results obtained in this survey.

Outfall	810038 (001)	
Survey Date From	8-12-80	10-8-80
To	8-13-80	10-9-80
Flow Rate (M^3/day)	465	592
	mg/l	mg/l
Suspended solids	100	46
Dissolved solids	2,000	2,400
Conductance (umhos/cm)	955	3,750
COD	83	42
TOC	32	16
Cyanide (Total)	0.011	< 0.005
Cyanide (Free)	< 0.011	< 0.005
BOD_5	30	28
$CBOD_5$	21	29
$CBOD_{20}$	61	46
Nitrite & nitrate nitrogen-N	0.16	0.18
Ammonia nitrogen-N	0.30	0.09
Kjeldahl nitrogen-N	3.1	2.6
Orthophosphates-P	0.03	0.24
Total phosphorus-P	0.20	0.26
Hexavalent chromium (Cr^{+6})	< 0.002	< 0.002
Chlorides	166	450
Sulfate (SO_4)	540	750
Total cadmium (Cd)	< 0.02	< 0.02
Total chromium (Cr)	J 0.15	0.14
Total copper (Cu)	0.13	0.09
Total nickel (Ni)	0.22	0.21
Total lead (Pb)	< 0.05	< 0.05
Total zinc (Zn)	0.27	0.38

J - Lab estimated value.

Table 6 Sample Preservation

Parameter	Preservative
COD & TOC (Chlorine Absent)	10 drops conc. H_2SO_4/250 ml (to pH <2).
Cyanide & Thiocyanates	Dechlorinate if needed with sodium thiosulfate (1 drop 0.141 N/mg/l Cl_2/250 ml. 10 drops 10 N NaOH (to pH ≥12)/250 ml.
D.O.	Fixed on site.
Total Metals	2 ml 1:1 HNO_3/250 ml (to pH <2).
Oil & Grease	10 drops conc. H_2SO_4/250 ml. (to pH <2).

All samples cooled to 4°C and preserved upon collection and chain of custody maintained.

Survey by: Gary Boersen, Environmental Engineer
Edward Hamilton, Water Quality Technician
Kent Mottinger, Water Quality Technician

Contact with Management: William Tischler, Technical Director - Finishing & Certified Operator

Physical, Chemical & Bacteriological Analyses by: Environmental Protection Bureau Laboratory

Report by: Gary Boersen
Edward Hamilton
Point Source Studies Section
Environmental Services Division
Environmental Protection Bureau
Michigan Dept. of Natural Resources

Distribution "A"
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1/30/81

Figure 1 Hoover Universal - Wastewater Treatment Diagram

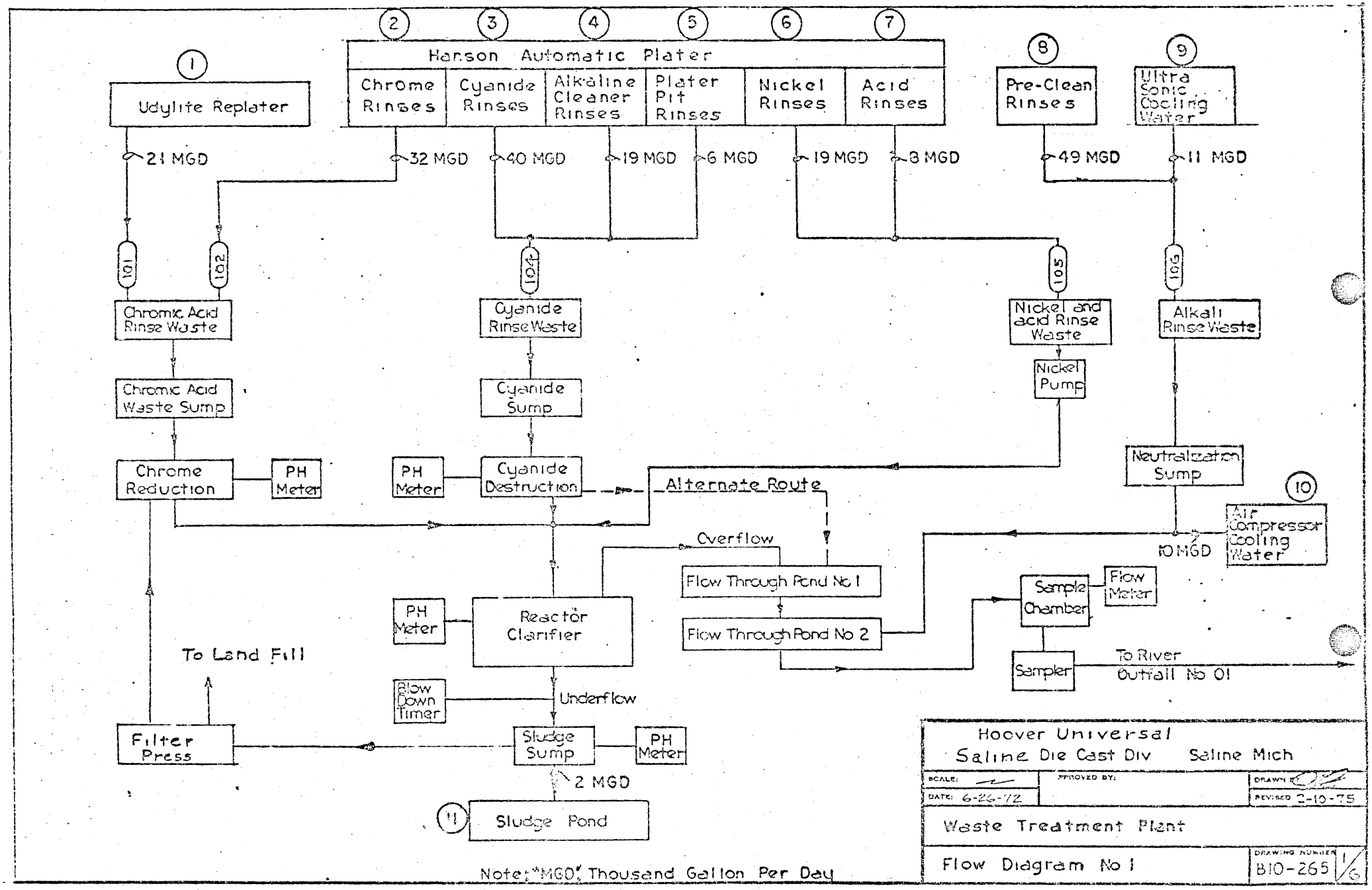
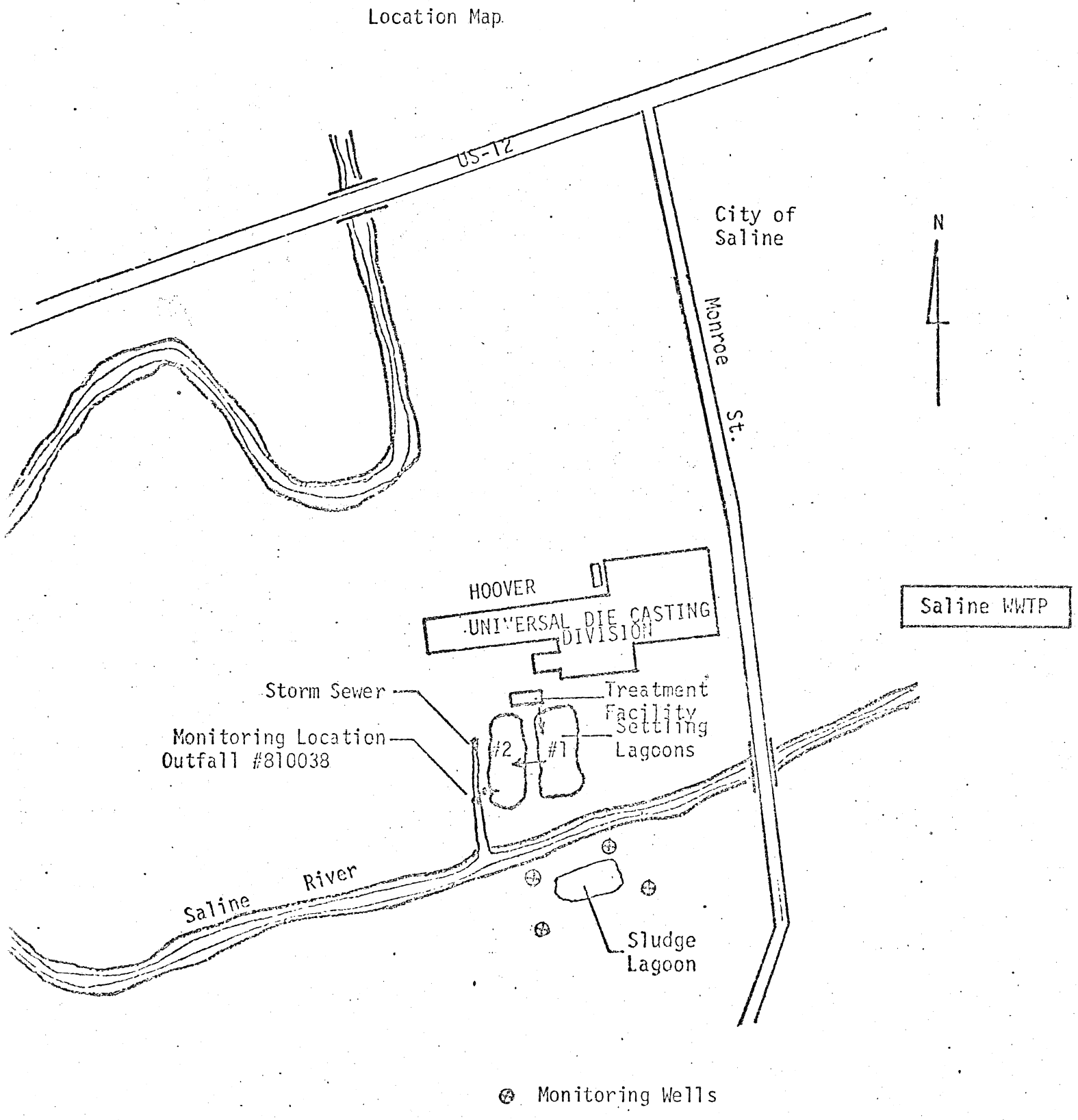


Figure 2 Hoover Universal, Inc. - Saline Die Casting Division



MICHIGAN WATER RESOURCES COMMISSION
BUREAU OF WATER MANAGEMENT
ENVIRONMENTAL PROTECTION BRANCH
DEPARTMENT OF NATURAL RESOURCES

Report of an
Industrial Wastewater Survey
Conducted at
HOOVER BALL & BEARING
UNIVERSAL DIE CASTING DIVISION
All Outfalls No. 810017
Washtenaw County
Saline, Michigan
March 3-4, 1975

Survey Summary

Wastewater monitoring was performed during one twenty-four hour survey period at Hoover Ball & Bearing, Universal Die Casting Division, starting Monday, March 3, 1975.

The results of this survey were compared to the initial limitations in the facility's National Pollutant Discharge Elimination System Permit, No. MI0003239, issued January, 1975. The company did not meet the daily maximum concentration limit at outfall 810038(001) for total copper and total zinc. Total copper and total zinc loadings from outfall 820038(001) were above the daily average limit. The results of the twenty-four hour composite sample met the maximum daily loading limitations for outfall 820038(001). The filterable total chromium in a sample of the sludge being discharged to the sludge impoundment, 810201, was above the maximum daily limit (Table 3).

The company's analytical results on a split of the composite sample collected by the survey staff generally did not agree with results reported by the Water Resources Commission laboratory (Table 3).

A comparison of the results of this survey with the results of the survey conducted September 1973 shows that the concentrations of zinc, copper, chromium and hexavalent chromium in outfall 810038 were substantially higher during this survey (Table 4).

Survey Comments

The company uses approved EPA testing methods for all chemical analysis except total zinc. Total zinc is determined using a Hach kit.

Foaming was noted at the outfall during the survey.

Purpose of Survey

The purpose of the survey was to determine the quality and quantity of wastewater being discharged by Hoover Ball & Bearing, Universal Die Casting Division, a principal discharger, to the Saline River and to check the company's compliance with their NPDES permit.

Plant Processes

The Universal Die Casting Division manufactures finished plated parts for the automotive industry. The plant employs 360 people and operates 17 hours a day, 5 days per week. Production was considered normal during the survey period with the plant utilizing approximately 40,000 lbs. of raw zinc a day.

Within the plant, 12 die casting machines form the molten zinc into company products. After die casting, the zinc parts are trimmed, buffed, plated, painted and assembled.

One plating line along with a small replate line comprise the plant's plating operation. The plating line consists of alkaline and electrocleaners flowing rinses, an acid dip along with a copper-cyanide plate, nickel plate, and a chrome plate. The replate line is composed of a caustic stripper, rinses, an electrocleaner, acid dip, and a chrome plate (Figure 1).

Water Supply, Wastewater and Treatment

Universal Die Casting Division obtains its process and cooling water supplies from five company operated wells. The plant's domestic supply is also obtained from wells. The well water is softened before use.

Process wastewaters originate in the plant's copper-nickel-chrome plating operation. As schematically presented on Figure 1, chromic and cyanide contaminated wastewaters are pretreated before entering the reactor clarifier along with the nickel and acid rinse wastewaters. The chromium wastes are reduced through batch treatment in either of two, 32,000 gallon tanks while the cyanide wastes are batch treated in either of two, 16,000 gallon tanks. The treated chromium (810193) and cyanide (810200) wastewaters are sampled before being pumped to the clarifier.

Effluent from the clarifier enters a series of two ponds. Alkali rinse waters along with the air compressors cooling water is pH adjusted and mixed with a polymer before entering pond no. 2. The second pond discharges through an open ditch, outfall 810038, to the Saline River.

As noted on Figures 2 and 3, cooling tower bleed-off and the water softener backwash from the die casting department and boiler blowdown are discharged to the City of Saline's sanitary sewage system.

The sludge from the clarifier is pumped across the Saline River to a company owned sludge pond. The sludge from clarifier is sampled, by company personnel as it is being pumped (outfall 810201).

Survey Procedure

An existing 24-inch rectangular weir with end contractions, constructed by a Water Resources Commission survey crew on a previous survey, was used to monitor outfall 810038 (see Figure 4).

The weir was equipped with a water level recorder and an automatic sampler. The water level recorder provided a continuous account of the liquid level or head above the crest of the weir on a head versus time graph for the duration of the survey period. The total volume of wastewater over the weir during the survey period was computed from the graph. The automatic sampler obtained samples proportional to the instantaneous flow over the weir at 5-minute intervals. These individual samples were deposited in a clean container to make up a composite sample representative of the total flow over the weir during the survey period.

Individual grab samples were collected from outfall 810038 for general chemistry, metals, cyanide and oil & grease analyses. Individual grab samples were also collected from the chromium batch treatment tank (810193) after treatment was complete for the cyanide batch treatment (810200) after treatment was complete, and the clarifier sludge being pumped to the company sludge pond (810201).

All samples were collected and preserved according to Table 5.

The composite and grab samples were transported to the Bureau of Water Management laboratory located in Lansing for selected quantitative physical and chemical analyses. The following formula was used to compute the pounds per day of various wastewater constituents discharged:

lbs/day = flow (mgd) x conc. (mg/l) x unit weight of water (8.34 lbs/gal).

The results of the physical, chemical and bacteriological analyses are presented in Tables 1 and 2.

Table 1 Quantitative analyses of the 24-hour composite samples collected from Hoover Ball & Bearing, Universal Die Casting Division discharge, 810038, to the Saline River to determine the concentration of the wastewater constituents present in the samples, plus the computed pounds per day (lbs/day) of these constituents being discharged. Also noted are the highest and lowest flow rates recorded during the survey period.

From	3-3-75 - 11:00 am	
To	3-4-75 - 10:45 am	
Total flow monitored (gal)	138,000	
Computed flow rate (mgd) *	0.139	
Highest flow rate (mgd)	0.353	
Lowest flow rate (mgd)	0.038	
pH	9.1	
	mg/l	lbs/day
Suspended solids	20	23
Total nickel (Ni)	0.4	0.5
Total zine (Zn)	1.8	2.1
Total copper (Cu)	0.90	1.0
Hexavalent chromium (Cr^{+6})	0.04	0.05
Total chromium	0.39	0.45
Cyanide (CN)	< 0.02	--

* Flow rates used in the computation of lbs/day.

Table 2 Quantitative analyses of grab samples collected from Hoover Ball & Bearing, Universal Die Casting Division, to the Saline River to determine concentrations of select physical, chemical and bacteriological constituents present in the wastewater.

Outfall	810038 (001)	810038 (001)	810038 (001)	810038 (001)	810200 (cyanide batch)	810200 (cyanide batch)	810193 (chromium batch)	810201 (sludge)
Time	11:00a	10:30p	7:25a	10:40a	2:35p	6:45p	10:45a	2:45p
Date	3-3-75	3-3-75	3-4-75	3-4-75	3-3-75	3-3-75	3-3-75	3-3-75
Temp.	5	6.5	7	7	11	13	5.5	--
pH	9.6	9.8	9.5	9.7	10.1	10.8	3.1	10
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Suspended solids	21	21	15	15	--	--	--	--
Freon extractables	3	< 2	2	< 2	--	--	--	--
Chlorine residual	< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--
Total nickel	0.17	0.5	0.3	0.8	--	--	--	--
Total zinc	0.3	0.55	0.5	0.35	--	--	--	--
Total copper	0.07	1.8	1.0	1.2	--	--	--	--
Hexavalent chromium (Cr^{+6})	0.05	0.02	0.02	0.02	< 0.01	0.03	< 0.01	--
Total chromium	0.14	0.35	0.2	0.95	1.2	3	450	--
Filterable chromium	--	--	--	--	--	--	--	4.2
Filterable nickel	--	--	--	--	--	--	--	0.41
Filterable zinc	--	--	--	--	--	--	--	0.8
Filterable copper	--	--	--	--	--	--	--	0.05
Total cyanide	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	9.4	< 0.02	--

Table 3 Comparison of results obtained during the survey at Hoover Ball & Bearing, Universal Die Casting Division with the facility's NPDES Permit, No. MI0003239, and the results obtained by the company on a split of the composite sample collected by the survey staff.

Source	Parameter (Unit)	NPDES Permit Limitations Average Daily	NPDES Permit Limitations Maximum Daily	Company Results	Survey Results mg/l	Survey Results lbs/day
810038 (001)	Suspended solids mg/l	25	40	8	20	--
	Suspended solids lbs/day	53	85	--	--	23
	Oil & Grease mg/l	--	10	--	[3 - <2 - 2 - <2]	
	Total chromium mg/l	0.3	0.6	0.07	0.39	--
	Total chromium lbs/day	0.64	1.27	--	--	0.45
	Total copper mg/l	0.3	0.6	0.42	0.9	--
	Total copper lbs/day	0.64	1.27	--	--	1.0
	Total nickel mg/l	1	2	0.15	0.4	--
	Total nickel lbs/day	2.1	4.2	--	--	0.5
	Total zinc mg/l	0.5	1	0.30	1.8	--
	Total zinc lbs/day	1.1	2.1	--	--	2.1
	Cyanide mg/l	--	0.025	0	< 0.02	--
	Hexavalent chromium mg/l	0.05	0.1	0	0.04	0.05
	pH (range)	6.5 - 10.5		9.5	9.1	
810193 Chromium batch discharge	Hexavalent chromium	--	--	--	[<0.01]	--
	pH	--	--	--	[3.1]	
810200 Cyanide batch discharge	Total cyanide	--	--	--	[<0.02, 9.4]	--
	pH	--	--	--	[10.1, 10.8]	
		Average 30-day	Maximum Daily			
Sludge dis-charge	Filterable copper mg/l	0.50	1.00	--	[0.05]	--
	Filterable zinc mg/l	0.50	1.00	--	[0.8]	--
	Filterable total chromium mg/l	0.50	1.00	--	[4.2]	--
	Filterable nickel mg/l	0.80	2.00	--	[0.41]	--
	pH (range)	8.0 - 11.5		--	[10]	

[ ] - grabs

Table 4 Comparison of loading found during the 1973 survey at Hoover Ball & Bearing, Universal Die Casting Division and those found during the 1975 survey.

	1973 Survey 810038				1975 Survey 810038	
Survey Period	1st 24-Hour		2nd 24-Hour		1st 24-Hour	
From	9-4-73 - 11:15 am		9-5-73 - 11:15 am		3-3-75 - 11:00 am	
To	9-5-73 - 11:15 am		9-6-73 - 10:40 am		3-4-75 - 10:45 am	
Total flow monitored (gal)	116,000		219,000		138,000	
Computed flow rate (mgd) *	0.116		0.227		0.139	
Highest flow rate (mgd)	0.271		0.349		0.353	
Lowest flow rate (mgd)	0.055		0.079		0.038	
	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day
Suspended solids	11	10.7	17	32.1	20	23
Total zinc	0.24	0.23	0.38	0.72	1.8	2.1
Total copper	0.07	0.07	0.1	0.19	0.9	1.0
Hexavalent chromium	0.01	0.01	< 0.01	--	0.04	0.05
Total chromium	0.04	0.04	0.05	0.09	0.39	0.45
Cyanide	< 0.02	--	< 0.02	--	< 0.02	--

* Flow rates used in the computation of lbs/day.

Table 5 Sample Preservation

Parameter	Preservative
Cyanide	2 drops 10 N NaOH (to pH 10)/125 ml.
General Chemistry	Cooled to 4°C.
Total Metals	10 ml 1:1 HNO_3/1 liter.
Oil & Grease	1 ml 1:1 H_2SO_4/250 ml. Cooled to 4°C.

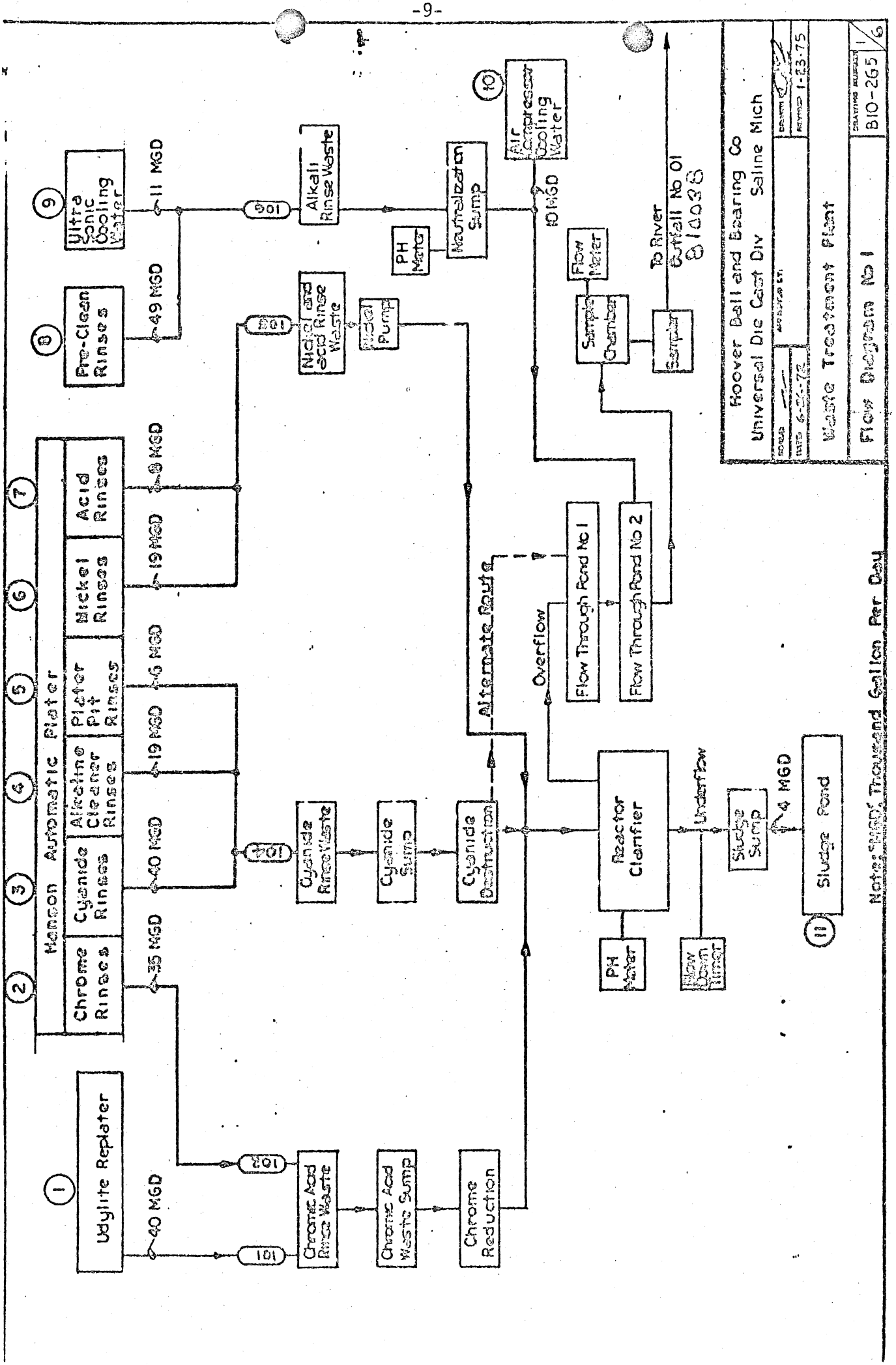
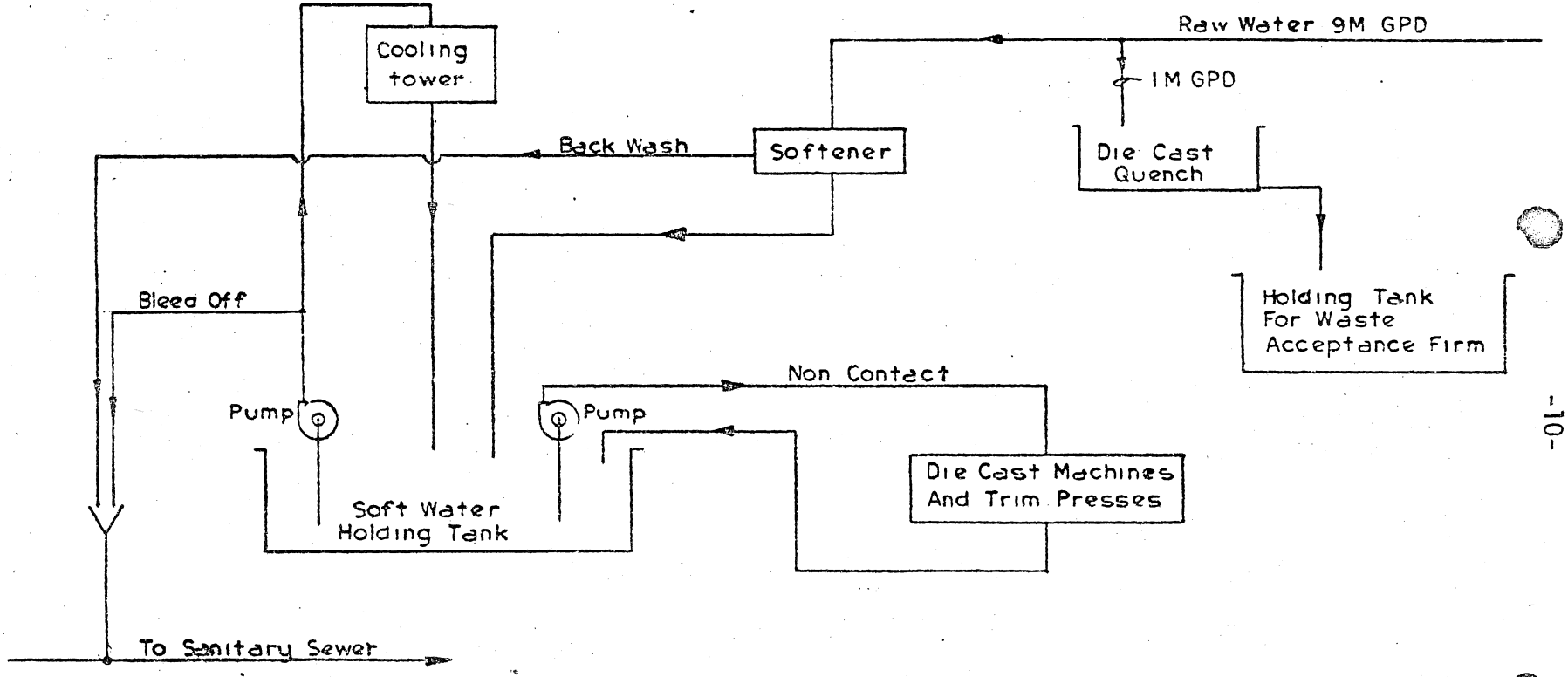

Hoover Ball and Bearing Co
Universal Die Cast Div Saline Mich
Waste Treatment Plant
Flow Diagram No 1
B10-265
Manson Automatic Plater
Chrome Rinses
Cyanide Rinses
Alkaline Cleaner Rinses
Plater Pit Rinses
Nickel Rinses
Acid Rinses
Udylite Replater
Pre-Clean Rinses
Ultra Sonic Cooling Water
Air Compressor Cooling Water
Alkali Rinse Waste
Nickel and acid Rinse Waste
Chromic Acid Rinse Waste
Chromic Acid Waste Sump
Chrome Reduction
Cyanide Rinse Waste
Cyanide Sump
Cyanide Destruction
Alternate Route
Overflow
Flow Through Pond No 1
Flow Through Pond No 2
Reactor Clarifier
Underflow
Sludge Sump
Sludge Pond
Neutralization Sump
PH Meter
Nickel Pump
Sample Chamber
Flow Meter
To River Outfall No 01
40 MGD
35 MGD
40 MGD
19 MGD
6 MGD
19 MGD
8 MGD
49 MGD
11 MGD
10 MGD
4 MGD
Note: MGD, Thousand Gallon Per Day

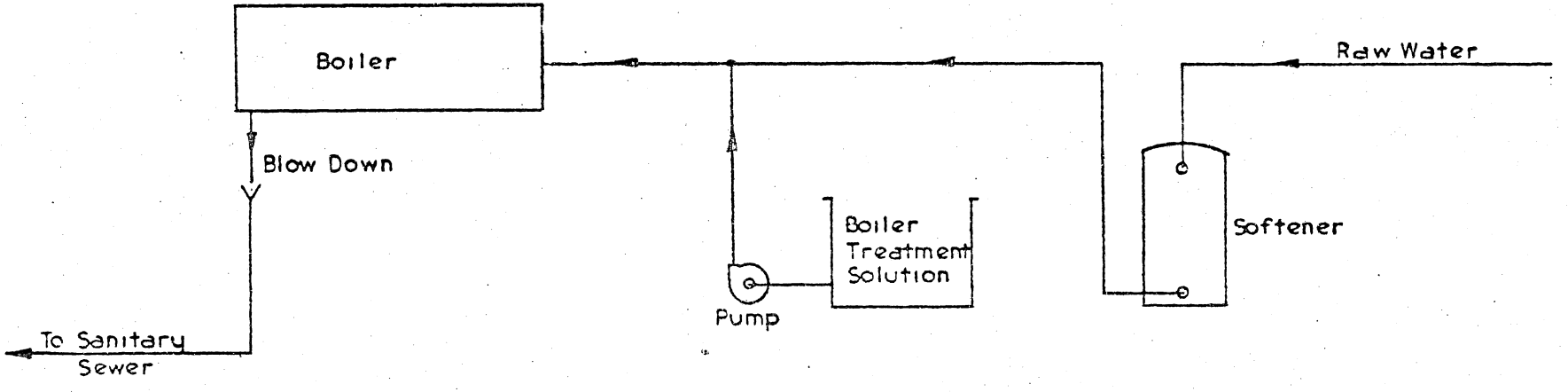
Figure 1

Figure 2



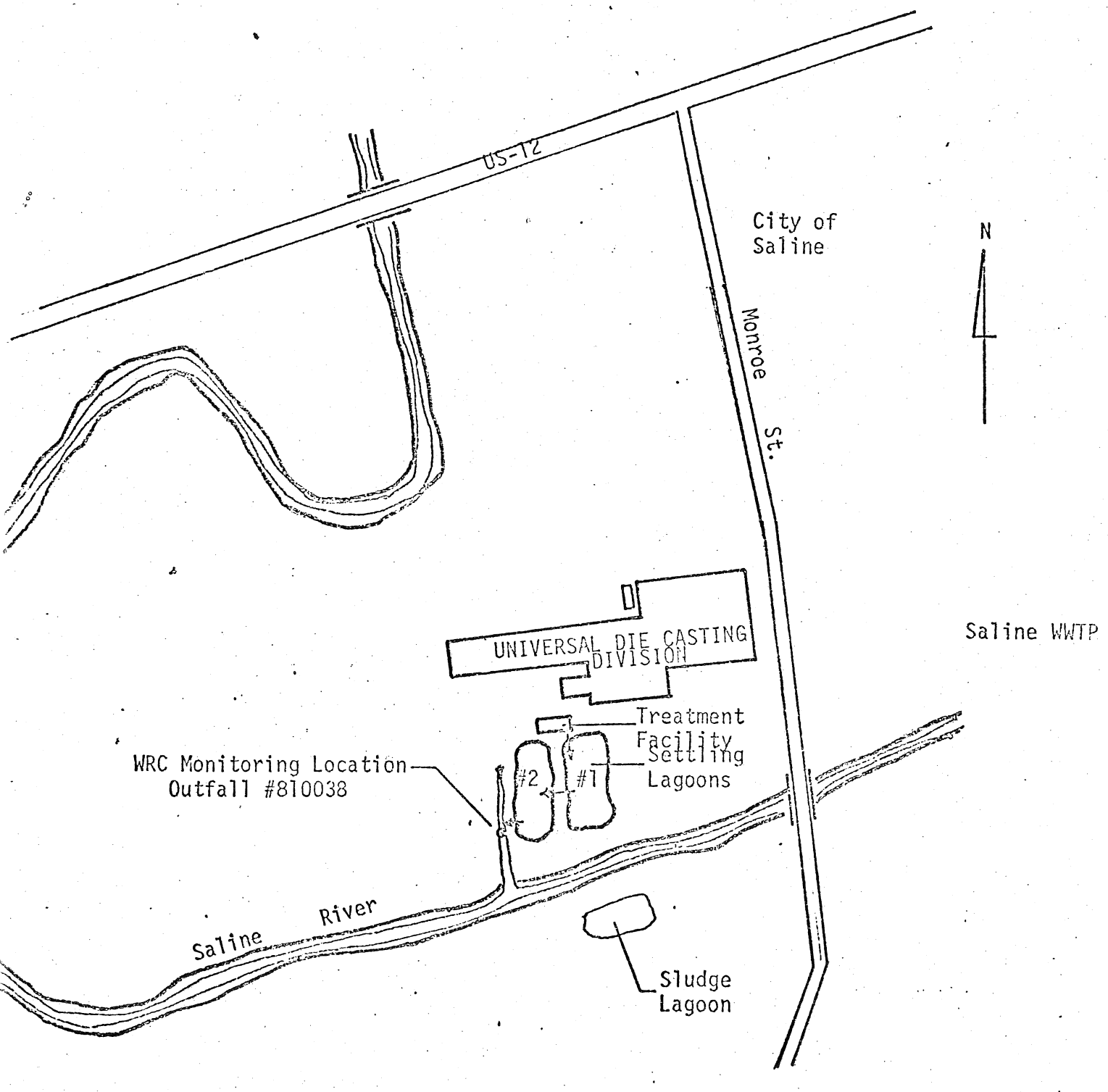
Hoover Ball and Bearing Co Universal Die Cast Div Saline Mich		
SCALE:	APPROVED BY:	DRAWN BY
DATE: 6-22-73		REVISED 1-23
West Treatment Plant Die Cast Dept		
Flow Diagram No 2		DRAWING NUMBER 310-265

Figure 3



Hoover Ball and Bearing Co Universal Die Cast Div Saline Mich		
SCALE:	APPROVED BY:	DRAWN BY
DATE: 6-21-73		REVISED 1-23-75
Waste Treatment Plant — Boiler		
Flow Diagram No 3		DRAWING NUMBER 810 265 3/6

Universal Die Casting Division
Federal Ball & Bearing Company



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Distribution "A"
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